

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) A device, comprising:
- a substrate having a cavity that extends into the substrate, ~~said the~~ cavity having an opening on at least one surface of the substrate;
 - an anode positioned within the cavity of the substrate;
 - a cathode comprising a first insulating layer positioned above the opening of ~~said the~~ cavity, wherein the anode receives electrons emitted by the cathode, and wherein the anode produces an electrical current to an external source in response to receiving the electrons;
 - a first grid having at least one aperture to allow the passage of electrons therethrough, wherein the first grid is constructed of an electrically conductive material, and wherein the aperture of the first grid is positioned between the cathode and anode;
 - a seal for creating a controlled environment in an area surrounding the first grid, the cathode and the anode, wherein the controlled environment allows for electron flow between the cathode, first grid and anode;
 - a circuit for heating the cathode, and
 - a control circuit for controlling the magnitude of the flow of electrons through the aperture of the first grid, thereby controlling the electrical current produced by the anode.
2. (Original) The device of claim 1, wherein the first grid is mounted on the anode.

3. (Original) The device of claim 1, wherein the first grid is configured with a plurality of apertures sized to allow the first grid to control the flow of electrons from the cathode to the anode when a control voltage is applied to the first grid.

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CONF 4. (Original) The device of claim 1, further comprising a second grid having a plurality of apertures configured for allowing the passage of electrons therethrough, wherein the aperture of the second grid is positioned between the cathode and anode, and wherein the second grid controls the flow of electrons from the cathode to the anode when a control voltage is applied to the second grid.

5. (Original) The device of claim 4, wherein the plurality of apertures of the second grid are aligned with the plurality of apertures of the first grid.

6. (Original) The device of claim 4, wherein the cathode is attached to the substrate to create a vacuum environment in an area surrounding the first grid, second grid, anode and cathode.

7. (Original) The device of claim 1, wherein the cathode comprises an electron emitting coating disposed thereon.

8. (Currently Amended) The device of claim 7, wherein the electron emitting coating ~~is comprised~~ comprises at least one of a metal tricarbonat~~e, strontium, calcium or barium.~~

9. (Original) The device of claim 1, wherein the distance between the anode and cathode is between 0.5 microns and 2 millimeters.

10. (Original) The device of claim 1, wherein the grid is a material selected from the group consisting of tungsten, gold, and tantalum.

11. (Original) The device of claim 1, wherein the controlled environment is an enclosed area surrounding the grid, cathode, and anode, wherein the enclosed area has a vacuum drawn therein.

12. (Original) The device of claim 1, wherein the controlled environment is an enclosed area filled with a gas selected from the group consisting of hydrogen, helium, argon, and mercury.

13. - 17. (Canceled)

18. (Currently Amended) A device, comprising:
a substrate having a cavity that extends into the substrate;
an anode constructed of an electrically conductive material, wherein the anode is positioned in the cavity of the substrate;
a cathode comprising a first insulating layer positioned over the cavity of the substrate, wherein the anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current to an external source in response to receiving the electrons;
a seal for creating a controlled environment in an area surrounding the grid, cathode and anode; and
a circuit configured for heating the cathode.

19. (Original) The device of claim 18, wherein the cathode is attached to the substrate to create a vacuum environment in an area surrounding the anode, cathode and grid.

20. (Original) The device of claim 18, wherein the cathode contains an electron emitting coating disposed thereon.

21. (Currently Amended) The device of claim 20, wherein the electron emitting coating ~~is made of~~ comprises at least one of a monocarbonate, a bicarbonate, a tricarboxate, strontium, calcium or barium.

22. (Original) The device of claim 18, wherein the space between the anode and cathode is between 0.5 microns and 2 millimeters.

23. (New) The device of Claim 1, wherein the first insulating layer comprises ceramic or silicon dioxide.

24. (New) The device of Claim 1, wherein the cathode further comprises a first conductive layer in contact with the first insulating layer.

25. (New) The device of Claim 24, wherein the first conductive layer comprises at least one of nickel, tantalum, platinum, tungsten, molybdenum, chromium/tungsten, titanium/tungsten, conductive alloys or intermetallic material.

26. (New) The device of Claim 24, wherein the cathode further comprises a second conductive layer in contact with the first insulating layer.

27. (New) The device of Claim 26, wherein the cathode further comprises a second insulating layer in contact with the second conductive layer.

28. (New) The device of Claim 18, wherein the first insulating layer comprises ceramic or silicon dioxide.

29. (New) The device of Claim 18, wherein the cathode further comprises a first conductive layer in contact with the first insulating layer.

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30. (New) The device of Claim 29, wherein the conductive layer comprises at least one of nickel, tantalum, platinum, tungsten, molybdenum, chromium/tungsten, titanium/tungsten, conductive alloy or intermetallic material.

31. (New) The device of Claim 29, wherein the cathode further comprises a second conductive layer in contact with the first insulating layer.

32. (New) The device of Claim 31, wherein the cathode further comprises a second insulating layer in contact with the second conductive layer.
